

REMARKS/ARGUMENTS

Previously presented independent Claims 10 and dependent Claims 11 and 13-18 are pending in this Application. New Claims 20-24 and 27 dependent on Claim 10, new independent Claim 25, and new Claim 26 dependent on new Claim 25 are herein proposed. Entry of new proposed Claims 20-27 is earnestly requested.

New Claim 20 is supported in the Specification at page 7, lines 26-28. New Claims 21-22 are supported in the Specification at page 7, lines 19-36. New Claims 23-26 are supported in the Specification at page 1, lines 6-7; page 3, lines 4-8; page 7, lines 4-36, and in original Claim 1. New Claim 27 is supported in the Specification at page 3, lines 14-16.

The Specification at page 3, lines 4-8, and original Claim 1, describe a thermally polymerizable mixture “consisting of” the multifunctional macromonomer and a radical polymerization initiator. The transitional phrase “consisting of” necessarily closes the mixture to the inclusion of other monomers not recited in the claim. However, the Specification also teaches that the thermally polymerizable mixtures utilized in the claimed method are open to, i.e., may include, non-polymerizable additives which do not materially affect the function of the basic and novel characteristics of the claimed method. Accordingly, persons having ordinary skill in the art would have understood from the Specification that the thermally a polymerizable mixture which is polymerized in accordance with Applicant’s claimed method is closed to monomers other than the multifunctional macromonomer recited in the claim yet open to conventional additives which do not materially affect the function or the basic and novel characteristics of the claimed method, i.e., the thermally polymerizable mixture polymerized in accordance with Applicant’s claimed method “consists essentially of” the multifunctional macromonomer and the radical polymerization initiator. New Claims 23 and 25 utilize the transitional phrase “consisting essentially of” to exclude monomers other

than the recited multifunctional macromonomer from the thermally polymerizable mixtures claimed.

No new matter has been added.

Rejection of Claims 10-11 and 13-18 under 35 U.S.C. § 112, 1st ¶ (written description)

Previously presented Claims 10-11 and 13-18 stand finally rejected under 35 U.S.C. § 112, 1st ¶, as not having been described in the Specification as originally filed. According to the Examiner (Office Action (OA), page 2):

Claim 10 recites “wherein the thermally polymerizable mixture does not comprise monomers other than the multifunctional macromonomer.” There is no support for this recitation in the originally filed disclosure.

Applicant disagrees. Claim 1, as originally filed, was directed to “[t]he use of a thermally polymerizable mixture consisting of a multifunctional macromonomer . . . and a polymerizable initiator as a binder for a fibrous or granular substrate” (Spec., original Claim 1). The Specification teaches that the object of the claimed invention is achieved by “thermally polymerizable mixtures consisting of multifunctional macromonomers and polymerization initiators” (Spec., p. 3, ll. 4-8). Persons having ordinary skill in the art would have understood therefrom that, as a matter of law, the thermally polymerizable mixtures utilized in Applicant’s claimed method are closed to monomers which are not the recited multifunctional macromonomer. The written description requirement of 35 U.S.C. § 112, 1st ¶, does not require an applicant to use the identical language in the claims that appears in the specification to define the scope of the reactants. The written description requirement of the first paragraph of Section 112 only requires the specification to provide a written description of the claimed invention which is sufficient to convey with reasonable clarity to persons having ordinary skill in the art that Applicant was in possession of the claimed invention at the time the application was filed. *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed.

Cir. 1991). From Applicant's Specification, persons having ordinary skill in the art would have understood that Applicant was in possession of the invention defined by rejected Claim 10 at the time this application was filed. The Examiner's rejection should be withdrawn.

Claim interpretation

The method Applicant claims requires "polymerizing the thermally polymerizable mixture . . . wherein the thermally polymerizable mixture consists essentially of "a multifunctional macromonomer and a radical polymerization initiator" and the multifunctional macromonomer comprises "at least one free-radically polymerizable group selected from the group consisting of an acrylate group, a methacrylate group, a maleate group, a vinyl ether group, a vinyl group, and an allyl group" (previously presented Claim 10). Persons having ordinary skill in the art would have understood from the teaching in the supporting Specification that the multifunctional macromonomer has a double bond content of 0.1 to 1.0 mol/100 g of macromonomer (Spec. p. 3, ll. 10-39) and polymerization inhibitors may be added to prevent premature polymerization of the ethylenically unsaturated compounds (Spec., p. 5, ll. 33-38). Persons having ordinary skill in the art would have learned from the Specification that the kind of free-radical polymerization initiators disclosed are suitable for polymerizing ethylenically unsaturated monomers (Spec., p. 6, l. 4, to p. 7, l. 2) and that every one of the multifunctional groups of the multifunctional macromonomer may be double bonds (Spec., p. 3, ll. 12-19). Persons having ordinary skill in the art also would have learned the from the Specification's teaching as a whole, including Examples 1-4 (Spec., pp. 8-9) and the specified temperatures to which the thermally polymerizable mixtures are to be heated (Spec., p. 7, ll. 22-31), that the multifunctional macromonomer of the thermally polymerizable mixtures must have at least one free-radically polymerizable ethylenically unsaturated group.

Rejections under 35 U.S.C. § 103(a) over Arkens/Arkens and Rockrath

Claims 10-11 and 13-14 stand finally rejected under 35 U.S.C. § 103(a) over Arkens (Arkens et al., U.S. 5,661,213, issued August 26, 1997). The Examiner's findings are not supported by Arkens' disclosure. The Examiner erred in concluding that the method Applicant claims would have been obvious to a person having ordinary skill in the art based on unsupported findings, and the final rejection of Applicant's claimed method should be withdrawn therefore.

The Examiner found that Arken's curable compositions are useful for binding heat resistant non-woven fibers (OA, p. 3). The Examiner also found that Arkens' binder is an addition polymer of a polyacid and a polyol (OA, p. 3). Apparently because Arkens teaches that the polyacid component of Arken's curable composition is a polymer prepared from at least one ethylenically unsaturated carboxylic acid (Arkens, col. 4, ll. 1-40), the Examiner finds that Arken teaches a method whereby a thermally curable composition comprising (1) a multifunctional macromonomer having at least one polymerizable group selected from the group consisting of an acrylate group, a methacrylate group, a maleate group, a vinyl ether group, a vinyl group, and an allyl group, and (2) a radical polymerization initiator, may be applied to non-woven fiber and thereafter thermally cured (OA, p. 3).

The Examiner's findings are not supported by Arken's disclosure. First, Arken's polyacid prepolymer is formed by polymerizing ethylenically unsaturated carboxylic acids. Arken's polyacid prepolymer so prepared has at least two acid groups available for reaction with at least two hydroxyl groups of the polyol component of the curable composition. Arken's polyacid prepolymer does not comprise at least one group with an ethylenically unsaturated double bond selected from the group consisting of an acrylate group, a methacrylate group, a maleate group, a vinyl ether group, a vinyl group, and an allyl group. Applicant's Specification teaches that its polymerizable macromonomer comprising

at least one free-radically polymerizable group selected from the group consisting of an acrylate group, a methacrylate group, a maleate group, a vinyl ether group, a vinyl group, and an allyl group has a “double bond content . . . in the range from 0.1 to 1.0 mol/100 g and preferably in the range from 0.2 to 0.8 mol/100 g of macromonomer” (Spec., p. 3, ll. 14-16).

In Arkens’ examples, the polyacid prepolymer is a polyacrylic acid. See Arkens’ Examples 1-18 and associated tables (Arkens, cols. 9-18). Arkens expressly states (Arkens, col. 3, ll. 57-59), “The polymeric polyacid is preferably an addition polymer formed from at least one ethylenically unsaturated monomer.” At column 4, lines 1-49, Arkens lists the wide range of ethylenically unsaturated monomers which may be polymerized to form the polyacid component of Arken’s curable compositions. There is no teaching or reasonable suggestion in Arken that the polyacid component of the curable composition retains at least one polymerizable double bond. To the contrary, the polyol component of the curable composition has multiple hydroxyl groups available to react with the multiple carboxylic acid groups of the polyacid component.

Furthermore, Applicant’s method excludes the polyol monomer Arkens includes in its curable compositions for reaction with the polyacid prepolymer macromonomer. Applicant’s thermally polymerizable mixture either excludes monomers other than the recited multifunctional macromonomer or consists essentially of the multifunctional macromonomer having at least one free-radically polymerizable group selected from the group consisting of an acrylate group, a methacrylate group, a maleate group, a vinyl ether group, a vinyl group, and an allyl group. In either case, Arkens’ additional polyol monomer is excluded.

For the reasons stated, the Examiner’s rejection of Claims 10-11 and 13-14 under 35 U.S.C. § 103 over Arkens is improper. The rejection should be withdrawn.

The Examiner’s rejection of Claims 15-18 under 35 U.S.C. § 103 over Arkens in view of Rockrath (Rockrath et al., U.S. 6,835,420 B1, issued December 28, 2004), also should be

withdrawn. The Examiner concedes that Arkens' curable composition comprises "a polyacid containing at least two carboxylic acid groups . . . and a highly reactive polyol" (OA, p. 4, ¶ 6). Whether or not Rockrath would have taught persons having ordinary skill in the art to react the functional groups of the polyacid and/or polyol components of Arkens curable composition with epoxy and/or isocyanate groups is immaterial to the patentability of the subject matter Applicant claims. Rockrath does not remedy the deficiencies in Arkens' teaching.

Rejection under 35 U.S.C. § 103(a) over Beck and Fujioka/Rockrath

Claims 10 and 15 stand finally rejected under 35 U.S.C. § 103 over Beck (U.S. Patent 5,096,938, issued March 17, 1992), in view of JP'914 (JP 60-163914, published August 26, 1985)(OA, pp. 6-7, ¶ 7). Claim 16 stands finally rejected under 35 U.S.C. § 103 over Beck in view of Rockrath. While the Examiner correctly finds that "Beck . . . is silent with respect to the use of coating [a] composition on fibrous or granular substrates" (OA, p. 6, ¶ 7), the Examiner erroneously finds that Beck's radiation-curable "binder is generic to all coatings" (OA, p. 6, ¶ 7) and concludes that the economic and other benefits of Beck's radiation-curable binder would have led persons having ordinary skill in the art without additional guidance or direction to use Beck's radiation-curable binder to coat or impregnate fibrous and/or granular substrates to somehow improve them (OA, p. 6, ¶ 7). Beck would not have taught persons having ordinary skill in the art to coat or impregnate a fibrous and/or granular substrate with Beck's radiation-curable composition, and neither JP'914 nor Rockrath provide the guidance or direction Beck's disclosure lacks.

Beck acknowledges that radiation-curable polyacrylate binders are known in the art (Beck, col. 1, ll. 18-21). Applicant's Specification similarly acknowledges that radiation-curable multifunctional macromonomers are known in the art (Spec., p. 3, ll. 10-12). In fact, Applicant's Specification cites many patent publications which describe radiation-curable

multifunctional macromonomers (Spec., p. 1, l. 9, to p. 2, l. 39). Nevertheless, Applicant teaches that persons having ordinary skill in the art reasonably would not have been led by Beck's teaching to reasonably expect success employing the known radiation-curable multifunctional macromonomers to coat or impregnate fibrous and/or granular substrates because (Spec., p. 2, ll. 8-13):

In processes wherein the addition polymerization of binders such as monomers or prepolymers is effected in a fiber matrix with the aid of radiative curing, the binder coated fiber material can only be cured to the extent that the radiation will penetrate the material. Since radiation intensity decreases quickly with increasing layer thickness, however, nonuniform polymerization of the monomers or prepolymers is likely unless certain costly and inconvenient measures are taken.

Applicant's Specification teaches that fibrous and/or granular substrates should not be coated or impregnated by radiation-curable macromonomers because the composites cannot be uniformly cured by irradiating the substrates. Therefore, the irradiated composites do not have the requisite mechanical strength and dimensional stability (Spec., pp. 2-3, bridging ¶). Accordingly, Applicant's invention is limited to "thermally polymerizable mixtures of multifunctional macromonomers and polymerization initiators and their use as binders for substrates" (Spec., p. 1, ll. 6-7).

Beck's teaching is specific to radiation polymerizable compositions. Beck expressly states (Beck, col. 3, ll. 36-40):

The coating materials prepared by the novel process are advantageously crosslinked by electron beams or, after the addition of a photoinitiator, by UV radiation, and give films which completely meet practical requirements.

Beck does not suggest, and persons having ordinary skill in the art would not have learned or understood from Beck's disclosure, that Beck's radiation curable acrylates are thermally polymerizable, are capable of being thermally cured, or may be thermally polymerized and/or thermally cured using Beck's photoinitiators.

Furthermore, Beck's process is designed to obtain "scratch-resistant coating[s]" on the order of 100 μm thickness on hard, flat substrate substrates (Beck, col. 5, ll. 40-49).

Persons having ordinary skill in the art would not have been led to thermally polymerize Beck's radiation-curable coatings to produce "scratch-resistant coating[s]" on the order of 100 μm thickness on fibrous and/or granular substrates (Beck, col. 5, l. 40, to col. 6, l. 16). In short, the Examiner clearly erred in finding that "Beck's . . . binder is generic to all coatings" and persons having ordinary skill in the art would not have reasonably expected success coating or impregnating fibrous and/or granular substrates with Beck's radiation-curable compositions and photoinitiators and then thermally polymerizing or curing the resulting composite. Applicant's claimed process is not reasonably suggested by Beck, and no combination of the teachings of Beck and JP'914 or Rockrath would have led a person having ordinary skill in the art away from the process Beck discloses to the process Applicant claims. The Examiner should withdraw the rejection.

Rejection under 35 U.S.C. § 103(a) in view of Rockrath

Claims 10-11, 13-14, and 17-18 stand finally rejected under 35 U.S.C. § 103(a) over Rockrath et al., WO 01/12736 A1, published February 22, 2001. At all times the Examiner cites and refers to Rockrath (U.S. Patent 6,835, 420 B1, issued December 28, 2004).

The Examiner finds (OA, pp. 8-9, ¶ 9):

Rockrath . . . discloses a binding agent comprising two functional groups which can enter into crosslinking reactions with complimentary functional groups in [a] crosslinking agent. The binding agent contains in an integrally polymerized form, at least one olefinically unsaturated polysiloxane macromonomer which contains at least 3.0 double bonds per molecule (abstract). Examples of suitable binders include acrylate copolymers (column 9, lines 12-15). Preferred acrylate copolymers (column 9, line 28) prepared by polymerizing polysiloxane macromonomer i.e. m3 (column 9, line 38) have a number average molecular weight of from 1500 to 10,000 (column 9, lines 48-49) and reads on the molecular weight of multifunctional macromonomer of [the] present claims.

The Examiner finds (OA, pp. 8-9, ¶ 9) that olefinically unsaturated bonds of Rockrath's polysiloxane macromonomer and polymerization initiators Rockrath employs therefore read on the multifunctional macromonomers used in Applicant's claimed process. Moreover, the

Examiner relies upon Rockrath's disclosure at column 19, lines 33-40, for its apparent teaching to coat a fibrous substrate.

Applicant responds first to the Examiner finding that Rockrath's coating composition is placed in contact a fibrous substrate and thermally polymerized on the fibrous substrate (OA, p. 8-9, ¶ 9). The Examiner appears to argue that the it would have been prima facie obvious to a person having ordinary skill in the art to contact a fibrous substrate with Rockrath's "monomer mixture" at any time before or after forming the fibrous substrate (OA, p. 8-9, ¶ 9). Applicant disagrees. The Examiner's efforts to make the prior art directions conform to the process Applicant claims is a prime example of improper hindsight reconstruction.

Rockrath's invention is directed to a thermally curable coating material and the "highly scratch-resistant multicoat clearcoat system produced using it" for automobile finishing and refinishing (Rockrath, col. 1, ll. 8-34). Automobile finishes have "very high optical demands regarding gloss, surface smoothness, and color" (Rockrath, col. 1, ll. 32-34). Rockrath's fibrous substrates are fiber composites or fiber-reinforced plastics over which the hard, glossy, stratch-resistant finishes may be applied (Rockrath, col. 19, ll. 30, to col. 20, l. 17). Rockrath's fiber composites or fiber-reinforced plastics are not "fibrous substrates" of the kind to which Applicant's claimed process applies. Applicant's Specification teaches that the fibrous substrates of the presently claimed process are "glass fibers, rock wool, natural fibers such as cotton, fibers composed of wood and sisal, manufactured fibers composed of polyester, polyacrylonitrile and nylon" (Spec., p. 7, ll. 11-31) which may be penetrated or impregnated by its thermally polymerizable mixtures in amounts ranging from 2-35 % and preferably 5-25% by weight, based on the weight of the substrates (Spec., p. 7, ll. 33-36). That there is no penetration or impregnation of a fibrous substrate when Rockrath's curable coatings are applied to its substrates is evident from Rockrath's teaching that its thermally

cured coatings may be cured by actinic radiation with similar success (Rockrath, col. 20, ll. 39-43; col. 21, l. 43, to col. 22, l. 9) and have a “dry film thickness of from 10 to 100 μm (Rockrath, col. 20, ll. 13-17). The articles formed in accordance with Applicant’s claimed process cannot be uniformly polymerized by actinic radiation without additional “costly and inconvenient measures” (Spec., p. 2, ll. 8-13).

Next, the Examiner found that Rockrath’s thermally curable coatings comprise an olefinically unsaturated polysiloxane macromonomer (OA, p. 8, ¶ 9). To the contrary, Rockrath teaches (Rockrath, col. 4, ll. 28-31; emphasis added):

[A]t least one binder (A) contains in copolymerized form at least one olefinically unsaturated polysiloxane macromonomer containing on average per molecule at least 3.0 double bonds.

To form binder (A), Rockrath copolymerizes an olefinically unsaturated polysiloxane macromonomer with at least one other unsaturated monomer to form binder (A) having at least two functional groups. Once polymerized, the olefinic unsaturation of the polysiloxane macromonomer appears to be spent. The polysiloxane macromonomer units of binder (A) of Rockrath’s curable composition no longer comprise at least one free-radically polymerizable group selected from the group consisting of an acrylate group, a methacrylate group, a maleate group, a vinyl ether group, a vinyl group, and an allyl group. At every appearance in Rockrath’s disclosure, binder (A) is a crosslinkable copolymer of an unsaturated polysiloxane macromonomer and another unsaturated monomer. See Rockrath, col. 6, l. 49, to col. 7, l. 50. Note especially Rockrath, col. 7, l. 57, to col. 8, l. 47. Rockrath expressly states (Rockrath, col. 7, ll. 57-66; emphasis added), “The binder (A) for inventive use may contain the polysiloxane macromonomers in copolymerized form in varying amounts.”

The Examiner will recognize that binder (a) of Rockrath’s Claim 1 “contains in copolymerized form at least one olefinically unsaturated polysiloxane macromonomer” (Rockrath, cols. 29-30). That Rockrath’s copolymerized polysiloxane macromonomer no

longer contains unsaturated double bonds is evident from Rockrath's supporting examples.

In Example 1, to form polyacrylate [binder] (A) Rockrath charges a reactor with "a monomer mixture of . . . ethylhexyl acrylate, . . . hydroxyethyl methacrylate, . . . styrene, . . . 4-hydroxybutyl acrylate, and . . . hexaacrylate-functional polysiloxane . . . and an initiator" and polymerizes the mixture of monomers at 140°C (Rockrath, col. 24, ll. 16-43). It is the residual functional groups of binder (A) and the corresponding functional groups on the crosslinking agent which react when thermally activated to crosslink and cure the thermally curable coating material according to Rockrath's process.

That persons having ordinary skill in the art would have understood that Rockrath's thermocuring reactions do not involve the polymerization of unsaturated monomers is evident from the advantageous thermocuring temperatures of from 50 to 100°C that Rockrath recommends (Rockrath, col. 21, ll. 32-42). In short, the Examiner's findings do not appear to be supported by Rockrath's disclosure when it is considered for everything it would have taught a person having ordinary skill in the art.

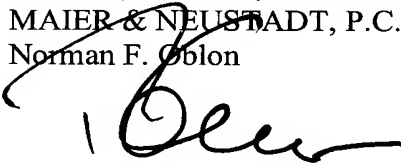
Finally, Applicant's claimed process excludes "monomers other than the multifunctional macromonomer" comprising "at least one free-radically polymerizable group selected from the group consisting of an acrylate group, a methacrylate group, a maleate group, a vinyl ether group, a vinyl group, and an allyl group" (Claim 10). Rockrath's thermally curable material comprises binder (A) and a crosslinking agent with corresponding functional groups. If at least one of the functional groups of Rockrath's binder (A) has ethylenically unsaturated double bonds available for crosslinking, then Rockrath's crosslinking agent must contain complementary unsaturated double bonds available for crosslinking. Therefore, even if the Examiner's interpretation of Rockrath's teaching is correct, Rockrath's thermally polymerizable mixture reasonably would be expected to comprise "monomers other than the multifunctional macromonomer" which the process

Applicant claims expressly excludes. Rockrath's thermally curable coating material includes a binding agent (A) and a crosslinking agent (B). Binding agent (A) has at least two functional groups which correspond to at least two functional groups of the crosslinking agent (B). In short, Rockrath's thermally curable coating composition contains at least two distinct monomers. The process Applicant claims consists essentially of one multifunctional macromonomer comprising at least one free-radically polymerizable ethylenically unsaturated group. When Applicant's macromonomer is thermally polymerized, it interreacts with itself. For all the reasons stated, the Examiner's rejections over Rockrath should be withdrawn.

Applicant earnestly moves the Examiner to withdraw the standing final rejections of pending Claims 10-11 and 13-18 and pass those pending claims to issue. In addition, Applicant asks the Examiner to enter new Claims 20-24 and 27 which depend upon and further limit pending Claim 10, new independent Claim 25, and new Claim 26 dependent on new Claim 25 to place the claimed invention in better condition for allowance or appeal.

Respectfully submitted,

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